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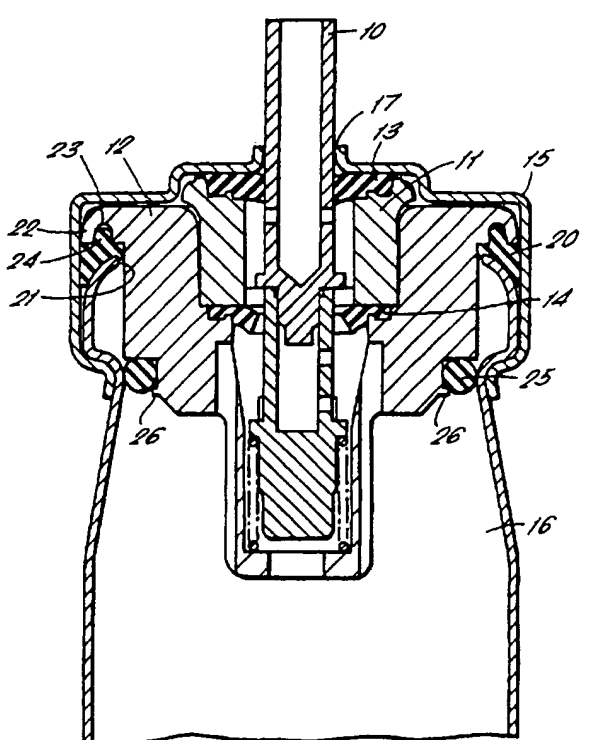
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/GB96/02793 <b>(22) International Filing Date:</b> 14 November 1996 (14.11.96)  <b>(30) Priority Data:</b> 9523457.1 16 November 1995 (16.11.95) GB  <b>(71) Applicant (for all designated States except US):</b> BESPAC PLC [GB/GB]; Bergen Way, North Lynn Industrial Estate, King's Lynn, Norfolk PE30 2JJ (GB).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> THOMAS, Jonathan [GB/GB]; 18 Jermyn Road, Gaywood, King's Lynn PE30 4AE (GB). WARBY, Richard [GB/GB]; 93 Church Road, Emneth, Wisbech, Cambridgeshire PE14 8AF (GB).  <b>(74) Agent:</b> BOULT WADE TENNANT; 27 Fumival Street, London EC4A 1PQ (GB).		<b>(81) Designated States:</b> AU, CA, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> IMPROVED SEAL ARRANGEMENTS FOR PRESSURISED DISPENSING CONTAINERS  <b>(57) Abstract</b> <p>A pressurised dispensing apparatus comprising a container for product to be dispensed and a valve means for controlling outflow of product from the container. The valve includes a valve body (12) located within the container, said container comprising an open ended container body (16) and a closure (15) fixedly attached to said container body for closing the open end thereof. The closure having an annular sidewall extending around at least an upper end of the container body. The apparatus further comprising a first seal (20) located in sealing engagement between the container body and the closure and a second seal (25) located in sealing engagement between the valve body and the container.</p> 		

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- 1 -

IMPROVED SEAL ARRANGEMENTS FOR  
PRESSURISED DISPENSING CONTAINERS

5           The invention relates to pressurised dispensing containers with an improved seal arrangement.

BACKGROUND ART

10           Pressurised dispensing containers are used for dispensing a wide variety of products from mobile to viscous liquid products, powdered products and the like and typically employ a liquid propellant such as a hydrocarbon or fluocarbon having sufficiently high vapour pressure at normal working temperatures to  
15           propel the product through the dispensing apparatus. These are commonly used for dispensing pharmaceuticals and medicaments.

          Generally such pressurised dispensing containers comprise a container, a dispensing valve and a closure  
20           which is crimped to the container to hold the valve in place. A seal, usually made of an elastomeric material, is compressed between the container and the closure to prevent leakage. The efficiency of the sealing arrangement is particularly important to  
25           prevent the leakage of propellants. It is important that leakage is minimised, despite the latest propellants being more environmentally friendly than predecessors, to prevent the loss of the container contents, ensuring that there are sufficient contents  
30           available after storage to meet the claims of the packaging and also to ensure that the ratio of propellant to product remains constant.

          It has hitherto been a problem that the deformation of the seal during the crimping operation  
35           can lead to a reduction in the effectiveness of the

- 2 -

seal. During the crimping operation, the seal may also be deformed in a manner which does not provide a true seal.

Also it has hitherto been a problem that the permeability of the seal material with respect to the propellants has led to loss of propellant during storage of the container and during the shelf-life of the product.

To overcome such problems it has been proposed to use two seals, both of which are sandwiched between the container and the closure. An example of such proposal is described in International patent specification W094/25373.

It is an object of the present invention to provide a further improved sealing arrangement for pressurised dispensing containers.

According to the invention there is therefore provided pressurised dispensing apparatus comprising a container for product to be dispensed, valve means for controlling outflow of product from the container, said valve including a valve body located within the container, said container comprising an open ended container body and a closure fixedly attached to said container body for closing the open end thereof, said closure having an annular sidewall extending around at least an upper end of the container body, said apparatus further comprising a first seal located in sealing engagement between the container body and the closure and a second seal located in sealing engagement between the valve body and the container.

Preferred embodiments of the present invention

- 3 -

will now be described, by way of example only, with reference to the accompanying drawings in which Figs. 1 to 6 illustrate a metering valve known in the prior art for use in a pressurising dispensing container incorporating alternative seal arrangements according to the present invention.

Referring to Figs. 1 and 2 a metering valve comprises a valve member 10 in the form of a valve stem which is axially slidable within an annular metering chamber 11. The metering chamber 11 and a portion of the valve member 10 are located within a valve body 12. An outer seal 13 and an inner seal 14 extend radially between the valve member 10 and the chamber 11. The outer seal 13 is sandwiched between an upper end of the metering chamber 11 and a closure or ferrule 15 which is crimped to a container body 16 covering an open end therefore, thus providing a closed container holding the product to be dispensed. The closure 15 has a central aperture 17 through which the valve member 10 extends. Depression of the valve member 10 causes the product to exit the container 16 from the chamber 11 through a passageway in the valve member 10. The form and operation of the metering valve may be selected as required.

The first seal 20 of the seal arrangement of the present invention is located between an external surface of the upper end of the container body 16 and an inner surface of an annular sidewall of the closure 15. In the embodiments of the invention shown in Figs. 1 and 2, the first seal 20 is provided by a gasket in sealing engagement with the rim forming the annular opening 21 of the container body 16. The first seal 20 is further in sealing engagement with a

- 4 -

flanged section 22 of the valve body 12. In Figs. 1 and 2 this flanged section also has an annular groove 23 which receives an annular ring 24 projecting from the first seal 20. This groove and ring arrangement 23, 24 is optional, and helps to locate and hold the first seal 20 in position relative to the valve body 12, especially during the fitting and crimping operations.

A second seal 25, shown in Figs. 1 and 2 as an O-ring, is provided in sealing engagement with an internal surface of the container body 16, preferably at a neck portion thereof, and the valve body 12. The second seal 25 may be retained by retention nodules 26 as illustrated in Fig. 1 or within an annular groove 27 in the valve body 12 as illustrated in Fig. 2.

The second seal 25 thus seals off the main body of the container body 16 from the first seal 20. This relieves the pressure on the first seal 20. Thus if that seal is weakened during the crimping operation, the integrity of the overall seal will be less effected. Furthermore, the second seal 25 limits the quantity of propellant or product which can reach the first seal 20. Thus if there is a problem in the efficiency of that seal, again a quantity of leakage can be reduced significantly. As the second seal 25 is not in contact with the closure 15, it is unaffected by the crimping operation. This provides extra security in the event that the first seal 20 is damaged in the crimping operation.

Referring now to Fig. 3, the parts corresponding to the embodiments of Fig. 1 and Fig. 2 are numbered similarly. However, whereas the first and second seal 20, 25 are arranged remotely from each other in Fig. 1 or Fig. 2, they are arranged adjacent and in sealing contact with each other in Fig. 3. The first seal 120

- 5 -

again is in sealing contact with a section of an upper end of the container body 16, although not with the annular opening 21 of the container body 16. The first seal 120 is also in sealing contact with the inner surface of the closure 15 and the flanged section 22 of the valve body 12. There is no annular groove and ring arrangement 23, 24 in this embodiment, although this is optional. The second seal 125 is in sealing contact with the valve body 12, the annular opening 21 of the container 16 and the first seal 120. The second seal 125 thus still serves the purpose of isolating the first valve 120 from the main pressure within the container body 16 and the product contained therein.

Referring to the embodiment of the invention shown in Fig. 4, the first and second seals are provided by a gasket 200 having two sealing bands 220 and 225. These sealing bands 220, 225 provide the first and second seals respectively and are in the same sealing contacts as the first and second seals 120, 125 of Fig. 3. The sealing bands 220, 225 have an annular air gap therebetween.

In Fig. 5 a further embodiment of the invention is illustrated. In this embodiment the first and second seals 320, 325 are provided by a double gasket 300. The first seal 320 is in a sealing engagement with the sidewall of the closure 15, the annular opening 21 of the container body 16 and the valve body 12. The second seal 325 is arranged above the first seal 320 in sealing contact therewith and also in sealing contact with the valve body 12 and the closure 15. The first seal 320 is preferably a low density polyethylene anti-extrusion ring.

In Fig. 6 yet another embodiment of the present invention is illustrated. In this embodiment, the



- 6 -

first seal 420 is provided by an O-ring located in a retaining collar formed by the upper end of the container body 16 adjacent the annular opening 21. The second seal 425 is in sealing contact with the  
5 first seal 420, the closure 15 and the valve body 12. In this embodiment, as in Figs. 1 to 4, the second seal 425 isolates the first seal 420 from the pressure and contents of the container body 16.

The first and second seals of all of the  
10 embodiments of the invention can be made from any appropriate material, including elastomers, rubbers (including nitrile rubbers), thermoplastics and so on. If the dispensing container is used for medicinal or pharmaceutical formulations, then an appropriate seal  
15 material must be selected which does not contaminate the product.

Preferably the second seal is made of an ethylene-propylene-diene rubber ("EPDM"). Optimally the first seal is also an EPDM gasket seal.  
20 Dispensing apparatus according to the present invention with seals from such materials, one of particular use when propellants such as HFC-134a or HFC-227 are involved and varying levels of ethanol.

- 7 -

CLAIMS:

1. Pressurised dispensing apparatus comprising a container for product to be dispensed, valve means for  
5 controlling outflow of product from the container, said valve including a valve body (12) located within the container, said container comprising an open ended container body (16) and a closure (15) fixedly  
10 attached to said container body for closing the open end thereof, said closure having an annular sidewall extending around at least an upper end of the container body, said apparatus further comprising a first seal (20) located in sealing engagement between the container body and the closure and a second seal  
15 (25) located in sealing engagement between the valve body and the container.
2. Pressurised dispensing apparatus as claimed in claim 1 in which the second seal is located in sealing  
20 engagement between the valve body and the container body.
3. Pressurised dispensing apparatus as claimed in claim 1 in which the second seal is located in sealing  
25 engagement between the valve body and the closure sidewall.
4. Pressurised dispensing apparatus as claimed in any one of the preceding claims in which the first and  
30 second seals comprise independent seal members.
5. Pressurised dispensing apparatus as claimed in any one of claims 1 to 4 in which at least one of the  
35 seals is an O-ring.

- 8 -

6. Pressurised dispensing apparatus as claimed in any one of the preceding claims in which the second seal is located in an annular groove (27) in an external surface of the valve body.

5

7. Pressurised dispensing apparatus as claimed in any one of the preceding claims in which the second seal is held in position on the valve body by means of locating nodules (26).

10

8. Pressurised dispensing apparatus as claimed in any one of the preceding claims in which the first and second seals are located adjacent to and in sealing contact with each other.

15

9. Pressurised dispensing apparatus as claimed in any one of claims 1 to 3 in which the first and second seals are provided by a single seal member having two sealing elements.

20

10. Pressurised dispensing apparatus as claimed in claim 9 in which the seal member comprises an annular gasket (200) and the sealing elements comprise a pair of concentric sealing rings (220, 225) projecting from an annular sealing face of the gasket.

25

11. Pressurised dispensing apparatus as claimed in claim 10 in which an annular gap is provided between the concentric sealing rings.

30

12. Pressurised dispensing apparatus as claimed in any one of the preceding claims in which the first seal is also in sealing engagement with the valve body.

35

- 9 -

13. Pressurised dispensing apparatus as claimed in any one of the preceding claims in which the second seal is in sealing engagement with both the container body and the closure.

5

14. Pressurised dispensing apparatus as claimed in any one of the preceding claims in which the first seal is positioned on the external surface of the container body in an annular indented portion.

10

15. Pressurised dispensing apparatus as claimed in any one of the preceding claims in which the valve body has a radially extended flange (22) extending between a main body portion and the sidewall of the closure.

15

16. Pressurised dispensing apparatus as claimed in claim 15 in which a transverse face of the flange provides a seat for engagement with at least one of the seals.

20

17. Pressurised dispensing apparatus as claimed in claim 16 in which an annular groove (23) is provided in the transverse face of the flange for receiving a corresponding projection on one or more of the seals in contact therewith.

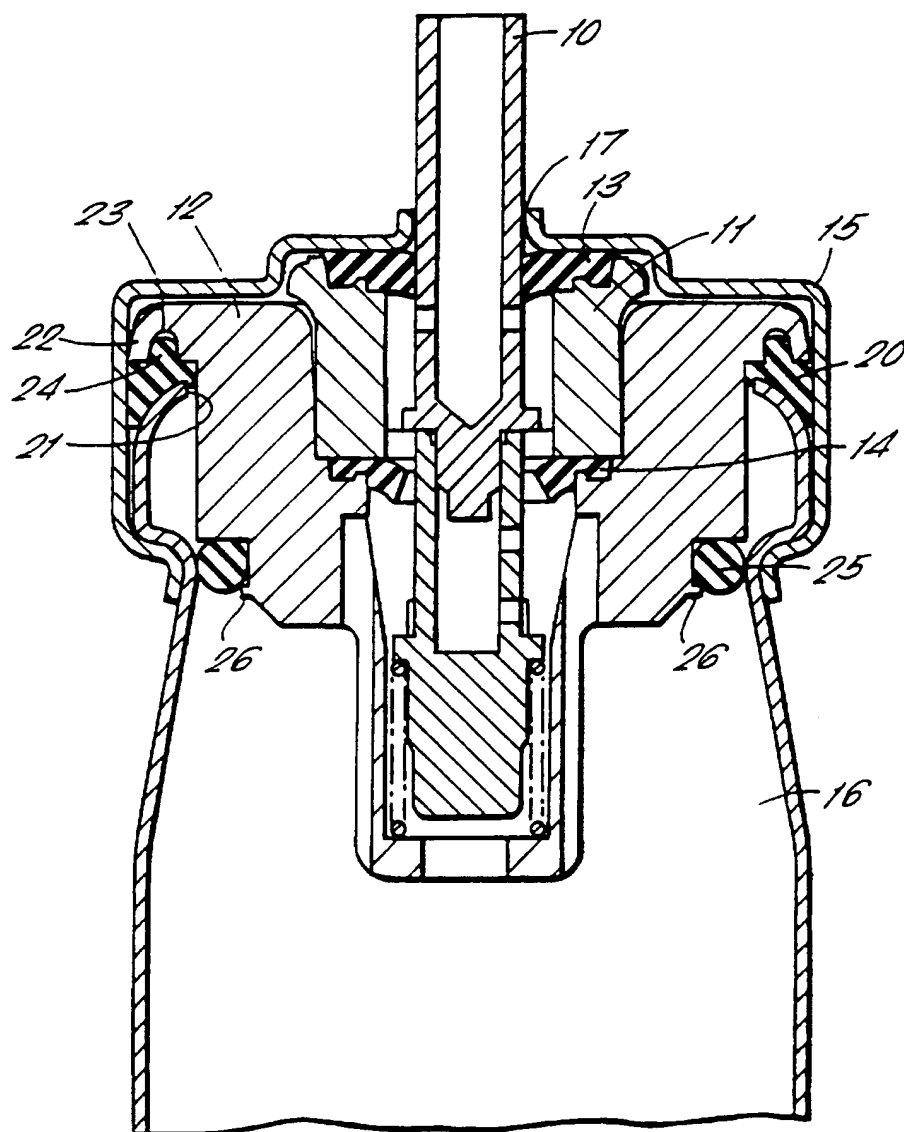
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18. Pressurised dispensing apparatus as claimed in any one of claims 15 to 17 in which the flange provides a further seal between the valve body and the closure.

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1/6

FIG. 1.



2/6

FIG. 2.

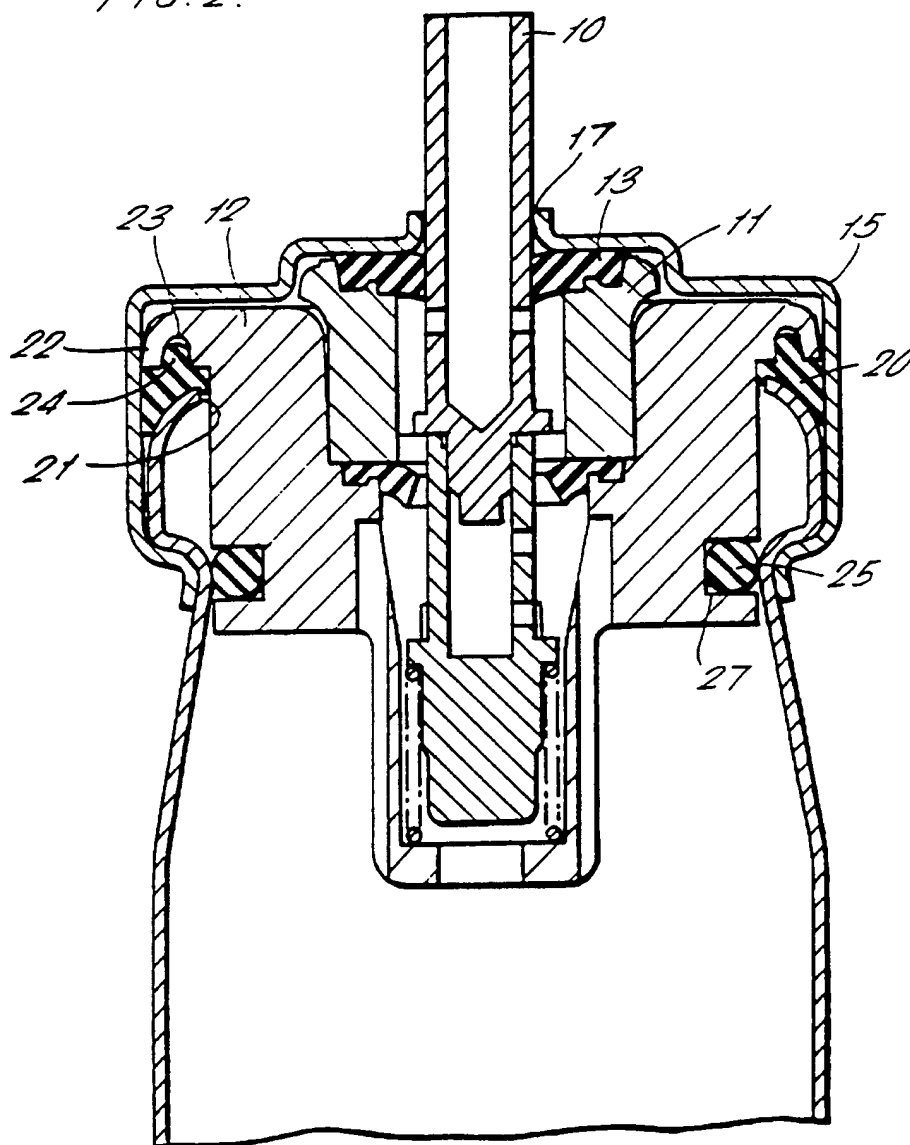


FIG. 3.

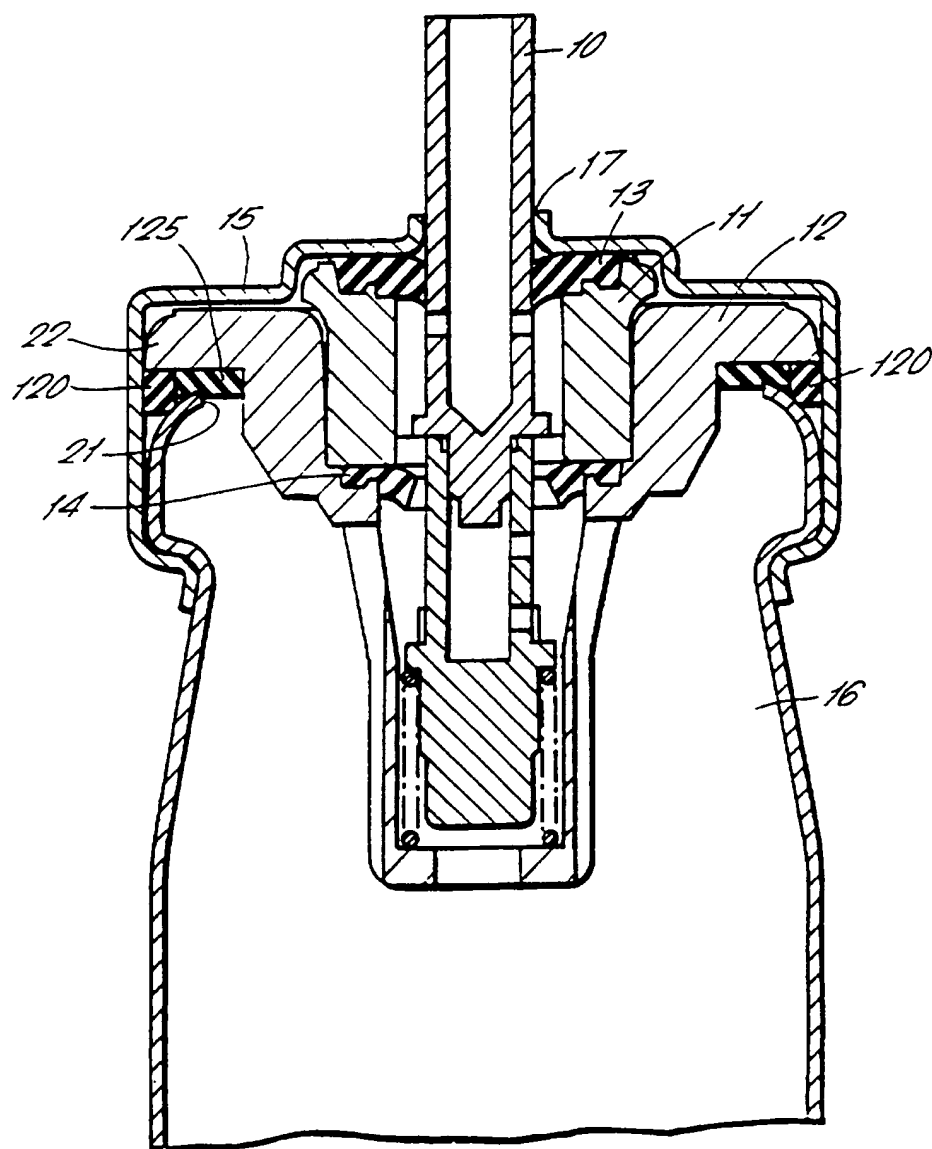


FIG. 4.

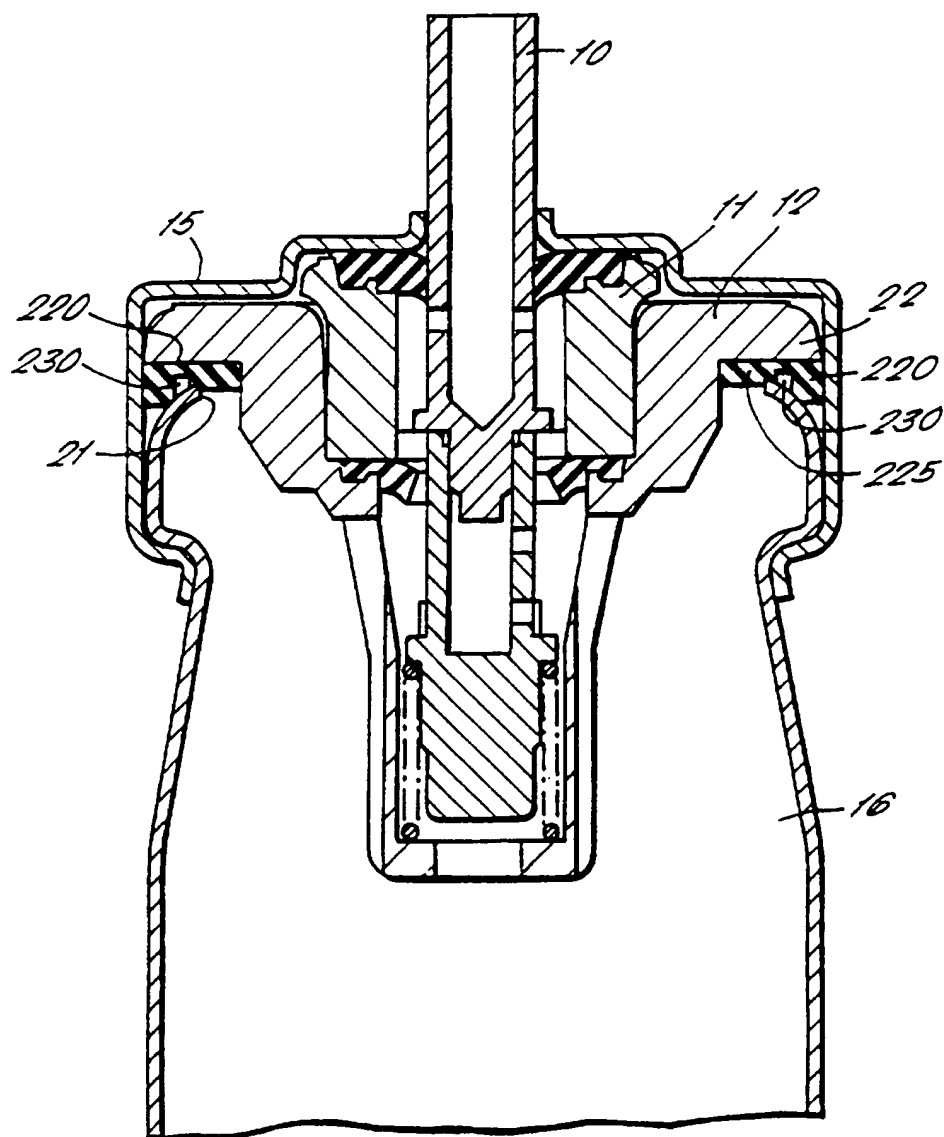




FIG. 5.

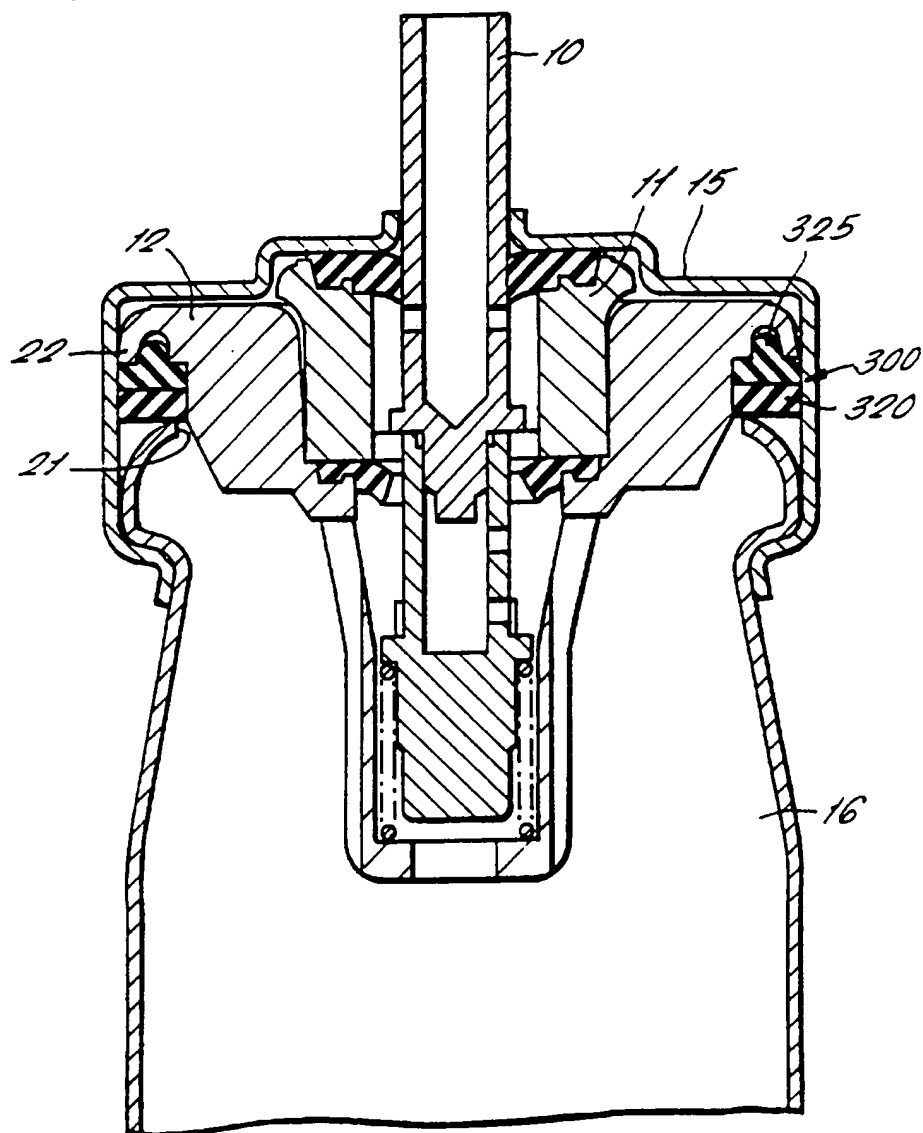
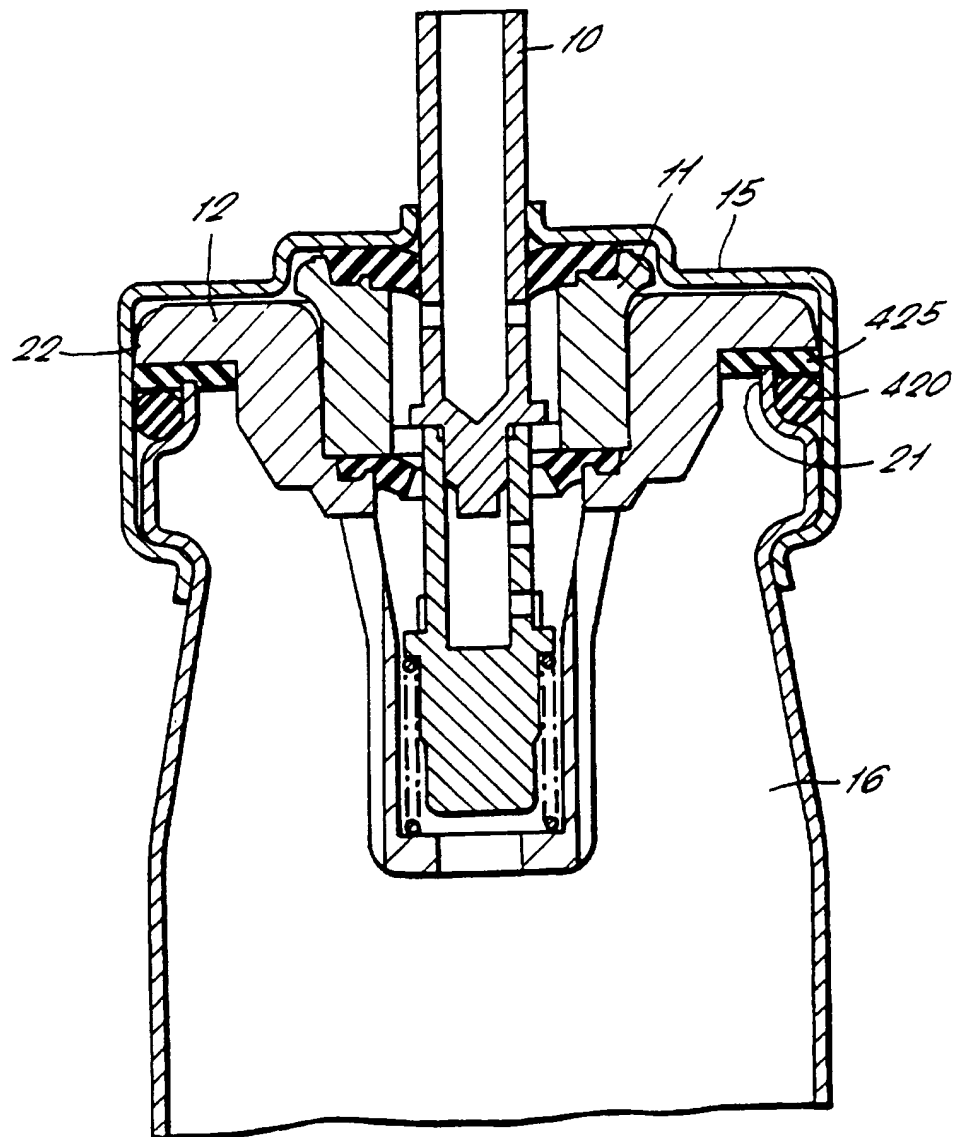


FIG. 6.



# INTERNATIONAL SEARCH REPORT

Inter    nal Application No  
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A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6    B65083/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 95 03985 A (MINNESOTA MINING & MFG) 9 February 1995	1-3
Y	see page 6, line 6 - line 12; figure 1	4-7, 9, 12-18
Y	--- WO 94 25373 A (MINNESOTA MINING & MFG) 10 November 1994 cited in the application see abstract; claim 1	4-7
Y	--- US 5 037 012 A (LANGFORD ALAN K) 6 August 1991 see column 1, line 42 - line 65; figure 1	12-18
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A	FR 1 562 597 A (SAMUEL TAYLOR PTY. LIMITED) 4 April 1969 see page 1, line 38 - page 2, line 27; figures -----	1

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International Application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A-9503985	09-02-95	US-A- 5400920 AU-A- 7209694 CA-A- 2167817 EP-A- 0710210	28-03-95 28-02-95 09-02-95 08-05-96
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